

NEW ECHEANDIA (LILIACEAE) FROM MEXICO

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Echeandia was proposed in 1797 by Ortega (Novarum, Aut Rariorum Plantarum . . . Descriptionum Decades, 90, Tab. 18) to differentiate New World plants with connate anthers and retorsely scaled filaments from *Anthericum* of the Old World, which have free anthers and smooth filaments. Subsequently, New World species with fused anthers have been assigned to *Echeandia* whereas those with free anthers, but otherwise indistinguishable from *Echeandia*, were relegated to *Anthericum* or genera subsequently included in *Anthericum*. This resulted in the grouping of quite unrelated taxa. With the exception of *A. panamense* Standl., all of the New World taxa are easily accommodated in two subgenera within a single genus. Because the differences between the New World genus and Old World *Anthericum* are of the same magnitude as those between *Anthericum* and its Old World relatives, the systematic relationships are better displayed by placing New World species in *Echeandia*.

The new species and combinations proposed below are made at this time to accommodate the need for valid names in floristic studies of the Mexican flora.

ECHEANDIA *gracilis* Cruden, sp. nov. (Fig. 1, 4).

Radicitubera juxta cormum, 1–2.5 cm longa; scapi 13–74 cm alti, plerumque minus quam 50 cm alti; folia basalia plerumque minus 25 cm longa, (2–) 4–13 mm lata; tepala crocea, 9.5–12 mm longa, interiora 5–7 mm lata, exteriora 1.5–3 mm lata; filamenta squamosa, 3.5–5.5 mm longa; antherae connatae, 3–5.5 mm longae, diametro ad apicem antherarum plus quam $\frac{1}{2}$ diametro ad insertiones filamentorum; capsula oblonga, 10–12 mm longa, 5–6 mm lata; chromosomatum numerus $n = 8$ (Cruden 1172, 1753, 1788, 1889).

TYPE: MEXICO. MEXICO: Ruta 190, K 59, ca 2.5 km W of Río Frío, pine woods with *Penstemon*, *Geranium*, *Castilleja*, *Cirsium*, ca 3060 m, 10 Aug 1970, Cruden 1753 (HOLOTYPE: UC; ISOTYPES: ENCB, GH, K, MEXU, MO, NY, US).

Additional specimens examined: MEXICO. DISTRITO FEDERAL: Estación La Cima, Serrania del Ajusco, Delegación de Tlalpan, 3000 m, 20 Aug 1965, Sanchez G, s. n. (ENCB); 16 Aug 1964, Martínez s. n. (ENCB); Rzedowski 18665 (ENCB); SE slope Cerro Pelado, 1–2 km NNW Estación La Cima, 3050–3300 m, 13 Jul 1960, Iltis, Koeppen, & Iltis 183 (WIS); 12 mi S Tlalpan, 10 000 ft, 16 Aug 1953, Manning & Manning 531031 (GH); Ruta 95 (Libre), K 35–36, ca 10 km N of Morelos, ca 2910 m, 28 Jul 1969, Cruden 1654 (F, GH, K, MEXU, UC, WIS); Ruta 95 (Cuota), K 36, ca 1 km N Morelos, ca 3120 m, 22 Jul 1968, Cruden 1401 (UC); 12 Aug 1966, Cruden 1172 (ASU, ENCB, F, GH, K, MEXU, MO, NY, TEX, UC, US); Parres to Milpa Alta, 30 Jun 1940, Miranda 497 (MEXU). MEXICO: Ruta 190 (Cuota), K



Fig. 1. *Echandia gracilis* Cruden. From the type collection (*Cruden 1753*). X 0.36.

47-48, below mirador, 2700 m, 23 Aug 1971, *Cruden* 1889 (ENCB, F, GH, K, MEXU, UC, US); Amecameca, 2500 m, 9 Aug 1964, *Cota* 45 (ENCB); W of Río Frío, 10,300 ft, 1 Aug 1953, *Manning & Manning* 53683 (GH, MEXU, TEX). MORELOS: Ruta 95 (Libre), ca K 49, 3 km S of Distrito Federal, 2880 m, 20 Aug 1970, *Cruden* 1788 (ENCB, GH, K, MICH, MO, NY, UC); Toro, 9800 ft, 5 Aug 1924, *Fischer* 168 (US, WIS); 6 km N Tres Cumbres, 10,200 ft, 13 Aug 1950, *Lyons* 125 (MICH); 2 mi SW Tres Cumbres, 26 Jul 1947, *Barklty, Webster, & Powell* 7377 (TEX); Tres Marías, 23 Aug 1910, *Orcutt* 3741 (F, GH, K, MO, US); PUEBLA: 6.5 mi E Tlachichuca on rd to Pico Orizaba, 2740 m, 22 Jul 1972, *Denton* 1846 (MICH); Rincón Quelite, between San Salvador el Seco and Alchichica, 2390 m, 28 Jul 1967, *Rosas R.* 481 (MEXU); Mt. Orizaba, 10,000 ft, 5 Aug 1891, *Seaton* 180 (F, GH, US).

This slender species is encountered in the zacatone and adjacent open pine forest of Morelos and the Federal District east to Volcán Orizaba. It is distinguished from the following by the shorter, generally unbranched flowering scapes, fewer, shorter and narrower leaves, shorter root-tubers, and smaller flowers with short, slightly tapered anthers.

ECHEANDIA mexicana Cruden, sp. nov. (Fig. 2, 4).

Radicitubera juxta cormum, 1.5–5 cm longa; scapi 32–115 cm alti, plerumque plus quam 50 cm alti; nodi florentes 6–20, internodiis infimis plerumque minus quam 5 cm longis; folia basalia (18-) 30–64 cm longa, (3.5-) 6–15 (-24) mm lata; tepala crocea, 12–17.5 mm longa, interiora 5–8 mm lata, exteriora 2–3 mm lata; pedicelli floriferi 7–11 mm longi, fructiferi 9–22 mm longi; filamenta squamosa, clavata, 4.5–8 mm longa antherae connatae, (5-) 6–8 (-9) mm longae, diametro ad apicem antherarum minus quam $\frac{1}{2}$ diametro ad insertiones filamentorum; capsula oblonga, 9–16 mm longa, 4–5.5 mm lata; chromosomatum numerus $n = 8$ (*Cruden* 1495, 1665, 1711, 1754, 1804, 1888, 2119) et $n = 16$ (*Cruden* 1232, 1978, 1985).

TYPE: MEXICO. JALISCO: Ruta 110, K 55, ca 6.5 km SW Mazamitla, ca 2280 m, pine woods with *Tigridia*, *Cosmos*, *Salvia*, *Calliandra*, 15 Sep 1973, *Cruden* 2073 (HOLOTYPE: UC; ISOTYPES: ENCB, GH, K).

Additional specimens examined: MEXICO. CHIHUAHUA: Sierra Canelo, Río Mayo, 1 Oct 1935, *Gentry* 1891 (GH, NA, UC, US). DISTRITO FEDERAL: Cerro Estrella, 1 km S Ixtapalpa, 2350 m, 4 Aug 1970, *Magana* 204 (ENCB); 4 km E Ajusco, 2750 m, 16 Aug 1964, *Hidalgo* 102 (ENCB); S San Antonio Tecomitál, 2300 m, 30 Aug 1964, *Villegas D.* 469 (ENCB); nr Cerro Conejo, ENE Ajusco, 2750 m, 23 Jul 1967, *Lopez G. s. n.* (ENCB); Pedregal, Valley of Mexico, 1 Sep 1936, *MacDaniels* 759 (F); San Angel, 16 Aug 1929, *Mexia* 2731 (UC); E Cerro Zacatepec, 15 Jul 1951, *Rzedowski* 315 (ENCB); Vallée de Mexico, Santa Fé, 6 Jul 1865-66, *Bourgeau* 413 (GH, K). GUANAJUATO: Ruta 101, ca 23.5 km NE Guanajuato, ca 2350 m, 23 Aug 1970, *Cruden* 1807 (ENCB, F, GH, K, MEXU, MICH, MO, UC, WIS); rd E from San Miguel Allende, 1 km W Queretaro, ca 2180 m, 23 Aug 1970, *Cruden* 1804 (ENCB, F, GH, K, MEXU, TEX, UC, US). JALISCO: Cerro Gordo, above San Ignacio, ca 12 mi SE Tepatitlán, 2200-2500 m, 29 Aug 1958, *McVaugh* 17497 (MICH); Ruta 110, K 46-47, ca 1 km NE Mazamitla, 2230 m, 29 Aug 1966, *Cruden* 1232 (F, GH, K, MEXU, TEX, UC); K 45-46, ca 2.5 km NE Mazamitla, ca 2250 m, 14 Sep 1971, *Cruden* 1985 (ENCB, F, GH, K, UC); Sierra del Halo, SSW Tecalitlán, 2000-2100 m, 28-30 Nov 1959, *McVaugh & Koelz* 1166 (MICH); Sierra del Tigre, 3 mi S Mazamitla, 2100-2200 m, 10 Nov 1959, *McVaugh & Koelz* 458 (MICH); 16 Sep 1952, *McVaugh* 12959 (MICH). MEXICO: Ruta 190 (Quota), K 20, E Ayotla, ca 2240 m, 23 Aug 1971, *Cruden* 1888 (ENCB, GH, K, MEXU, UC,



Fig. 2. *Echeandia mexicana* Cruden. Cruden 1985, Jalisco, 2.5 km NE Mazamitla. X 0.40.

WIS); Ruta 130, ca K 51, SW Toluca, 2180 m, 25 Sep 1973, *Cruden* 2119 (ENCB, GH, K, UC); 1 km NE Tenango del Aire, 2400 m, 11 Aug 1968, *Pineda R.* 455 (ENCB); E Cerro del Pino, nr Ayotla, 2600 m, 13 Jul 1967, *Rzedowski* 23938 (ENCB); 2 km SE San Francisco Chimalpa, Municipio de Naucalpan, 2600 m, 3 Sep 1967, *Cárdenas* 86 (ENCB); 1 km NE San Antonio, Municipio de Amecameca, 2550 m, 31 Oct 1968, *Rzedowski* 26422 (ENCB); Zitácuaro to El Aguila, Dist. Valle de Bravo, 2400 m, 11 Oct 1938, *Hinton et al.* 13355 (ARIZ, GH, K, MICH, NY, US); Cumbre to Gavia, Dist. Sultepec, 7 Oct 1935, *Hinton et al.* 8397 (ARIZ, NY, US); Sultepec, 2400 m, 2 Nov 1952, *Matuda et al.* 27750 (MEXU); Molino, 19 Aug 1936, *MacDaniels* 534 (F). MICHOACAN: Ruta 15, K 288-289, ca 15 km E Morelia, ca 2120 m, 30 Jul 1969, *Cruden* 1665 (F, GH, K, MEXU, NY, UC); rd to Volcán Parícutin, nr Capácuaro, 4 Nov 1958, *Jones* 22678 (WIS); 10 mi E Morelia, 7 Jul 1947, *Sauer* 1103 (UC); Sierra Torricillas, Dist. Coalcomán, 4 Oct 1939, *Hinton et al.* 15255 (ARIZ, GH, NA, NY, US); Cerro Azul, 2200 m, 1910 *Arsène* 6032 (GH, MO); above Lago de Pátzcuaro, between Comanja and Quiroga, 6-16 Oct 1962, *Weber & Charette* 11851 (MICH); Ruta 15, ca 2 km SE Comanja, 10 Aug 1968, *Cruden* 1495 (ENCB, GH, K, MO, UC); ca 18°45' N, 102°56' W, nearly W of Aguililla, 2000-2100 m, 18 Sep 1958, *McVaugh* 17868 (MICH); Tancítaro, Dist. Uruapan, 2250 m, 22 Oct 1940, *Hinton et al.* 15560 (ARIZ, GH, NY, US); Ruta 37: 29 mi S Ruta 15, 2260 m, 6 Oct 1966, *Anderson & Laskowski* 3889 (ENCB, MICH); K 45, 17 km SW Cherán, ca 2520 m, 13 Sep 1971, *Cruden* 1978 (ENCB, GH, K, UC); E San Juan Nuevo, ca 8 km S Uruapan, ca 6100 ft, 11-15 Oct 1961, *King & Soderstrom* 4749 (MICH, NY, UC, US); 6 mi N Uruapan, rd to Carapan, 1900 m, 20 Aug 1975, *Davidse & Davidse* 9885 (MO). MORELOS: Ruta 95 (Cuota), K 60-61, E Coajomulco, ca 2350 m, 28 Sep 1974, *Cruden* 2175 (ENCB, F, GH, K, MEXU, MICH, UC, US); Coajomulco, 4 km S Tres Marías, 25 Aug 1967, *Salinas S.* 164 (ENCB). PUEBLA: SE slope Popocatepetl, W. Metepec, ca 2520 m, 31 Aug 1962, *Ugent, Ugent & Flores C.* 1320 (WIS); 10.5 km NW Atenca, rd from San Salvador el Seco to Ciudad Serdán, ca 2350 m, 28 Jul 1970, *Cruden* 1711 (ENCB, F, GH, K, MEXU, MICH, MO, NY, TEX, UC, WIS); W of San Martín Texmelucan toward Río Frío, 6000-8000 ft, 1 Aug 1953, *Manning & Manning* 53693 (GH); Ruta 190, K 82-83, ca 2.5 km W San Lucas el Grande (at edge of Sta. Anita), ca 2350 m, 10 Aug 1970, *Cruden* 1754 (ENCB, F, GH, K, MEXU, MO, NY, UC, WIS).

This species is widely distributed in the Sierra Madre Occidental and Sierra Volcánica Transversal generally between 1900 and 2500 m in the pine-oak zone from Chihuahua southeast to Michoacán and east into Guanajuato and Puebla. It may be confused with *E. longipedicellata* a species of higher elevations. The latter has fewer flower bearing nodes, the distances between the nodes are greater, and the pedicels, either in flower and/or in fruit are usually longer. Depauperate specimens of *E. mexicana* resemble *E. gracilis* but the anthers of the latter are not strongly tapered. Specimens lacking root-tubers may be confused with *E. reflexa* (Cav.) Rose, whose tubers develop some distance from the corm. The latter species generally occurs at lower elevations in the area of geographical sympatry.

ECHEANDIA longipedicellata Cruden, sp. nov. (Fig. 3, 4)

Radicitubera juxta cormum, 2-4 cm longa; scapi 36-100 cm alti; nodi florentes 2-5(-9), internodiis infimis plerumque plus quam 5 cm longis; folia basalia (22-)30-73 cm longa, (5-)6-12(-15) mm lata; tepala crocea, 12-21 mm longa,



Fig. 3. *Echeandia longipediceliata* Cruden. From the type collection (Cruden 1828).
X 0.36.



Fig. 4. From left to right, flowers of *E. gracilis* (Cruden 1753), *E. mexicana* (Cruden 1978), and *E. longipedicellata* (Cruden 1828), respectively. X 1.0.

interiora 6.5–7 mm lata, exteriora 3–4 mm lata; pedicelli floriferi 14–29(-43) mm longi, fructiferi 22–30(-45) mm longi; filamenta squamosa, 6–12 mm longa; antherae connatae, 6–9 mm longae; chromosomatum numerus $n = 40$ (Cruden 1387, 1597, 1702, 1746, 1828).

TYPE: MEXICO. DURANGO: Ruta 40, K 161-162, ca 38 km E of El Palmito, in disturbed pine-oak-madrone woods, with *Viola*, *Tigridia*, *Salvia*, *Eryngium*, and *Penstemon*, ca 2550 m, 27 Aug 1970, Cruden 1828 (HOLOTYPE: UC; ISOTYPES: ENCB, F, GH, K).

Additional specimens examined: GUATEMALA. HUEHUETENANGO: rd to Todos Santos Cuchumatán, ca 1.1 km from Ruta Nacional 9, ca 3300 m, 30 Jun 1969, Cruden 1586 (ENCB, F, GH, K, MO, UC, WIS). MEXICO. CHIAPAS: Ruta 190, mountain ridges ca 14 km SE San Cristóbal de las Casas, 3000–3070 m, 20 Aug 1966, Cruden 1202 (ENCB, UC); 10 km SE San Cristóbal de las Casas, 2275–2700 m, 31 Aug 1971, Cruden 1926 (UC). DISTRITO FEDERAL: Eslava, 1 Oct 1938, Lyonnet 2860 (US); 4 km E Ajusco, 2750 m, 23 Jul 1967, Aquirre Z. 41 (ENCB); base of Cerro Xitle, ca 8500 ft, 13 Sep 1930, Russell & Souviron 172 (US). DURANGO: Ruta 40, ca 38 km E El Palmito, ca 2550 m, 13 Aug 1968, Cruden 1513 (UC); Ruta 40, ca 29 km W El Salto, 2775 m, 25 Aug 1973, Cruden 2046 (K, MEXU, UC). GUERRERO: 4.6 mi SW Gral. Nicolas Bravo, 58 km SW Ruta 95, ca 2485 m, 6 Aug 1970, Cruden 1746 (GH, K, MEXU, UC); slope of Cerro Teotepec, 3400–3600 m, 22 Jul 1969, Cruden 1633A (ENCB, F, GH, K, UC); ca 5.2 km SW Gral. Nicholas Bravo, ca 59 km SW Ruta 95, ca 2425 m, 24 Jul 1969, Cruden 1643 (ENCB, UC). MEXICO: Ruta 130, 45–50 km SW Toluca, ca 2700 m, 25 Sep 1973, Cruden 2120 (ENCB, F, GH, K, MEXU, MO, UC, US). MORELOS: rd to Lagos de Zempoala, 11–12 km W Ruta 95, ca 2800 m, 28 Jul 1969, Cruden 1656 (ENCB, K, UC); 20 Aug 1970, Cruden 1970 (GH, MEXU). OAXACA: Ruta 175, nr Campimento Río Molino, S of Oaxaca, ca 2200, 28 Jul

1968, *Cruden* 1436 (ENCB, UC); 21 Sep 1965, *Rzedowski* 20990 (ENCB); nr Cerro San Felipe, ca 17 km N Ruta 175, ca 2970 m, 8 Jul 1969, *Cruden* 1597 (ENCB, F, GH, F, GH, K, MEXU, MO, NY, UC, US); Ruta 175, ca 79 km NE Oaxaca, Llano de las Flores, ca 2790 m, 15 Jul 1968, *Cruden* 1387 (MEXU, UC); vicinity of Cerro San Felipe, 9500–11,000 ft, 1894, *Nelson* 1056 (US). SINALOA: Ruta 40, K 206-207, 7-8 km SW Durango, ca 1950 m, 6 Sep 1974, *Cruden* 2148 (GH, K, MEXU, UC); 4 mi W El Palmito, 26 Aug 1961, *Powell & Edmondson* 932 (MICH). VERACRUZ: Ruta 131, K 21-22, S. Altotonga, ca 2060 m, 27 Jul 1970, *Cruden* 1702 (ENCB, GH, K, UC); Ocotepc, Municipio de Jalacingo, 1860 m, 18 Aug 1971, *Ventura A.* 4098 (ENCB).

This species is found primarily in pine and pine-oak forest from Durango to Guatamala between 2200 and 3000 meters. It generally occurs at higher elevations than *E. mexicana* and in the latters absence is found at lower elevations.

The following new combinations are proposed.

ECHEANDIA durangensis (Greenman) Cruden, comb. nov.

Anthericum durangense Greenman. Proc. Amer. Acad. 39: 72. 1903. TYPE: MEXICO. DURANGO: near El Salto, 8000–8700 ft, 12 Jul 1898, *Nelson* 4544 (HOLOTYPE: US; ISOTYPES: GH, NY).

ECHEANDIA flavescens (Schultes & Schultes *fil.*) Cruden, comb. nov.

Anthericum flavescens Schultes & Schultes *fil.* Roemer and Schultes, Systema Vegetabilium 7: 1692 (1830). TYPE: MEXICO: *Karowinski* 1646 (M).

ECHEANDIA nana (Baker) Cruden, comb. nov.

Anthericum flavescens Schultes & Schultes *fil.* Roemer and Schultes, Systema Vegetabilium 7: 1692 (1830). TYPE: MEXICO: *Karowinski* 1646 (M).

ECHEANDIA scabrella (Bentham) Cruden, comb. nov.

Phalangium scabrellum Bentham. Plantae Hartwegianae, 293–4 (1848). TYPE: MEXICO: *Hartweg* 1622 (K). The specimen from Kew bears only the inscriptions: Hartweg (in ink) and 1622 (in pencil). Bentham gave Langos as the type loyalty, undoubtedly the city in the northeast corner of Jalisco.

The opportunity to examine material from the following herbaria is greatly appreciated: ARIZ, ENCB, F, GH, K, M, MEXU, MICH, MO, NA, NY, TEX, UC, US, WIS. My thanks to Kenneth G. Jensen for the preparation of the figures. John Crossett and an unidentified reviewer improved the Latin diagnoses.